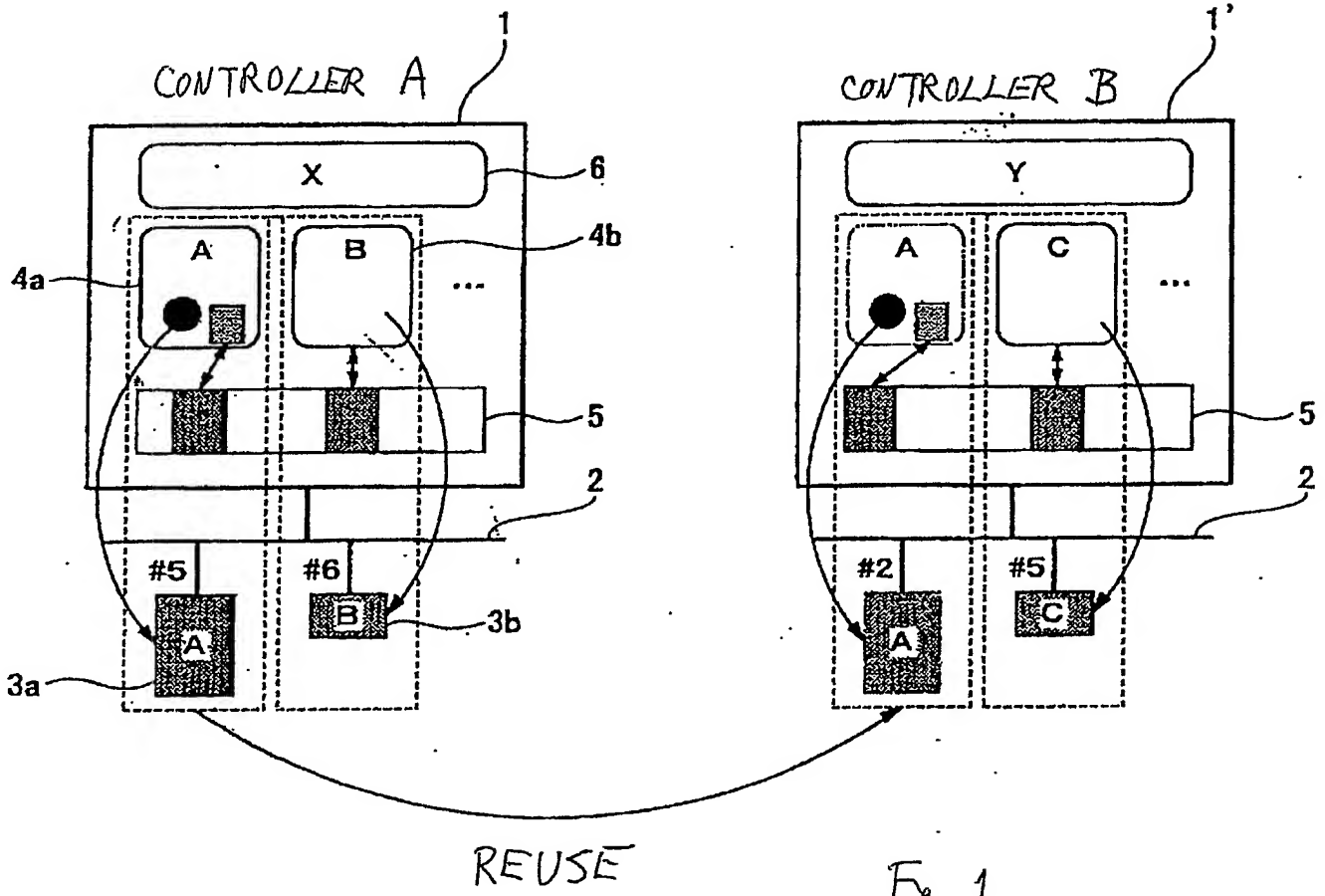

Fig. 1
(PRIOR ART)

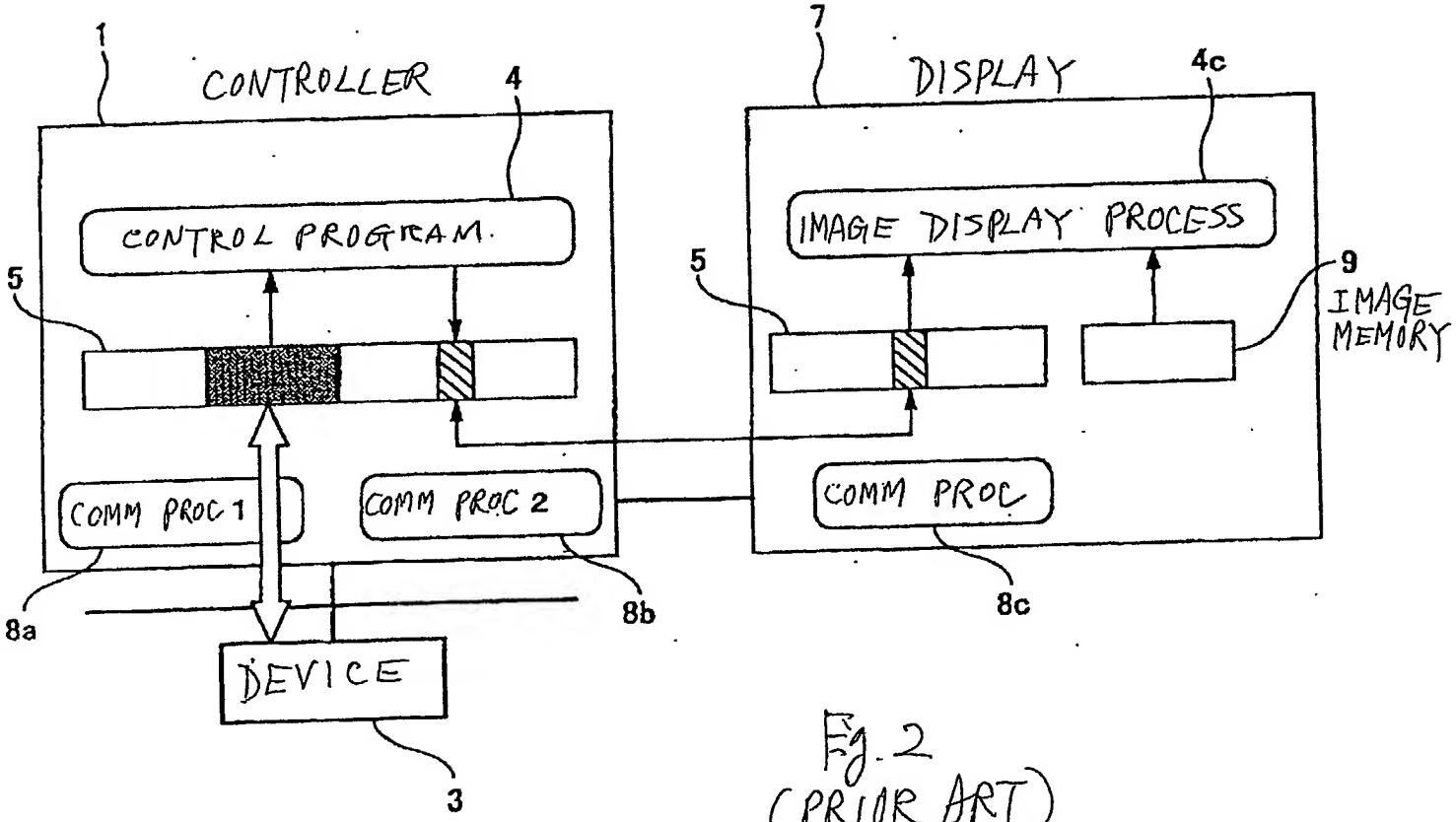

Fig. 2
(PRIOR ART)

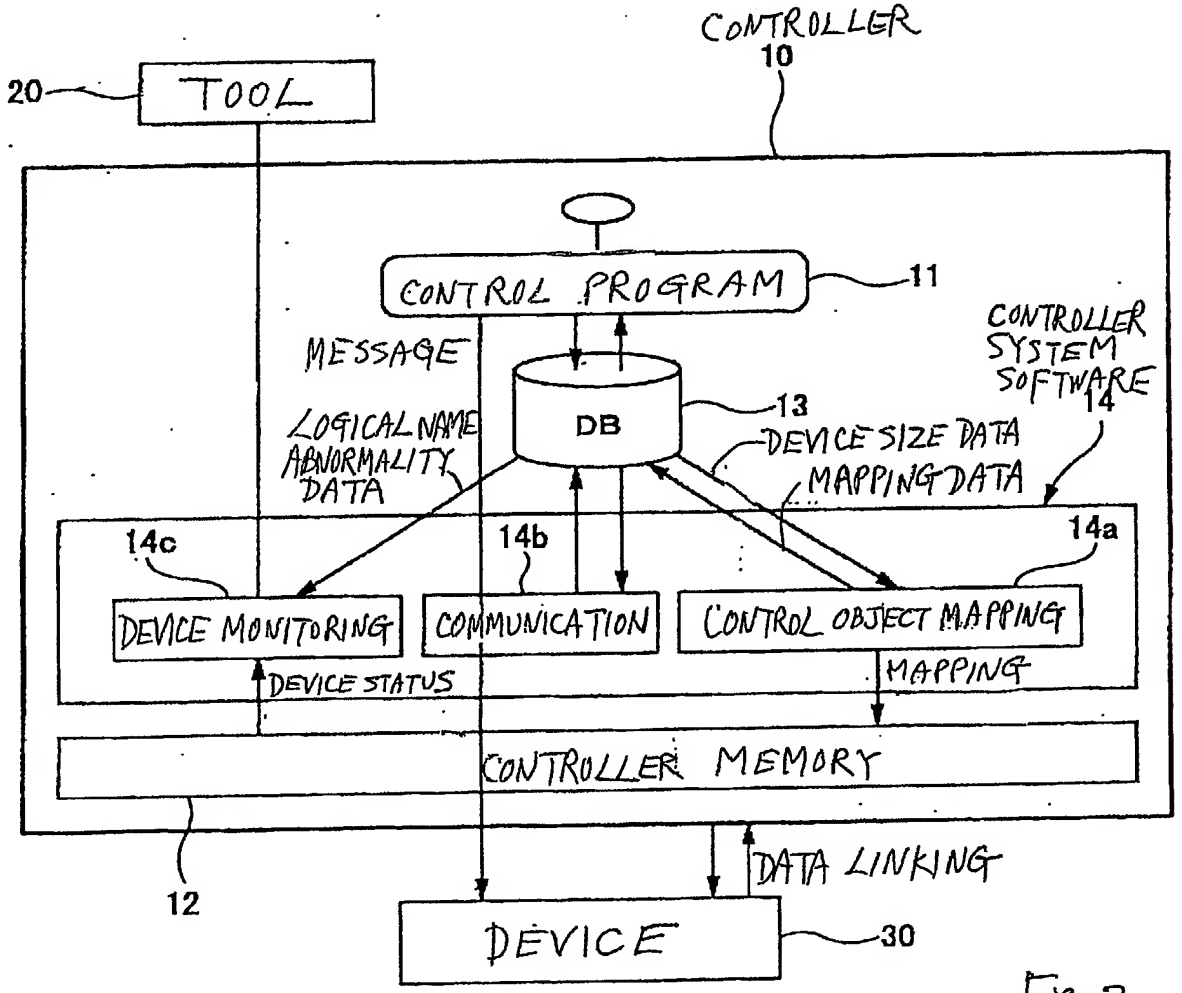

Fig. 3

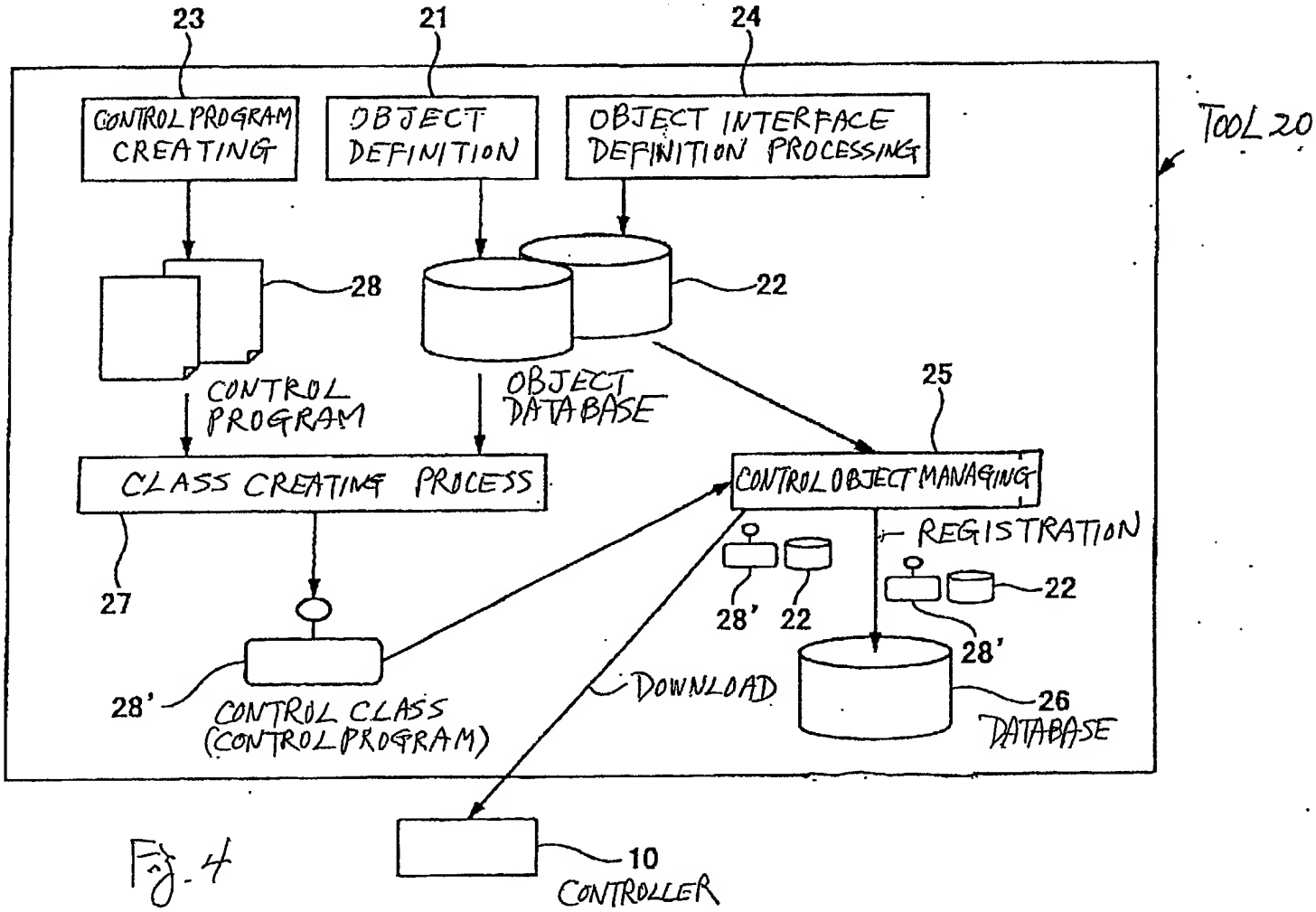

Fig. 4

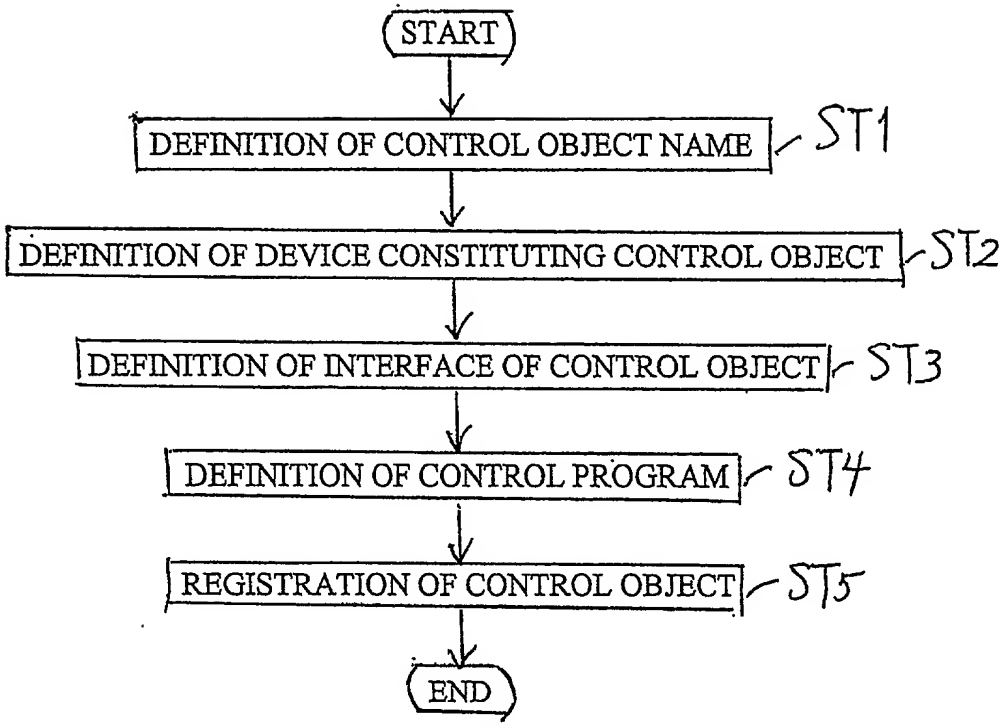
START
DEFINITION OF CONTROL OBJECT NAME
ST1
DEFINITION OF DEVICE CONSTITUTING CONTROL OBJECT
ST2
DEFINITION OF INTERFACE OF CONTROL OBJECT
ST3
DEFINITION OF CONTROL PROGRAM
ST4
REGISTRATION OF CONTROL OBJECT
ST5
END

Fig. 5A

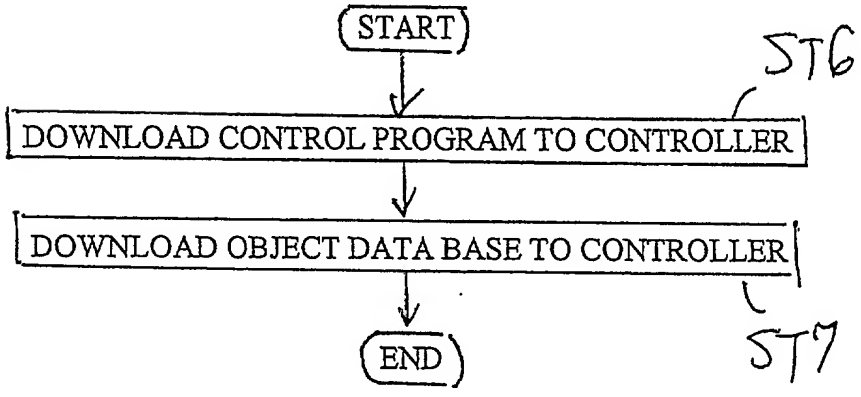
START
ST6
DOWNLOAD CONTROL PROGRAM TO CONTROLLER
DOWNLOAD OBJECT DATA BASE TO CONTROLLER
ST7
END

Fig. 5B

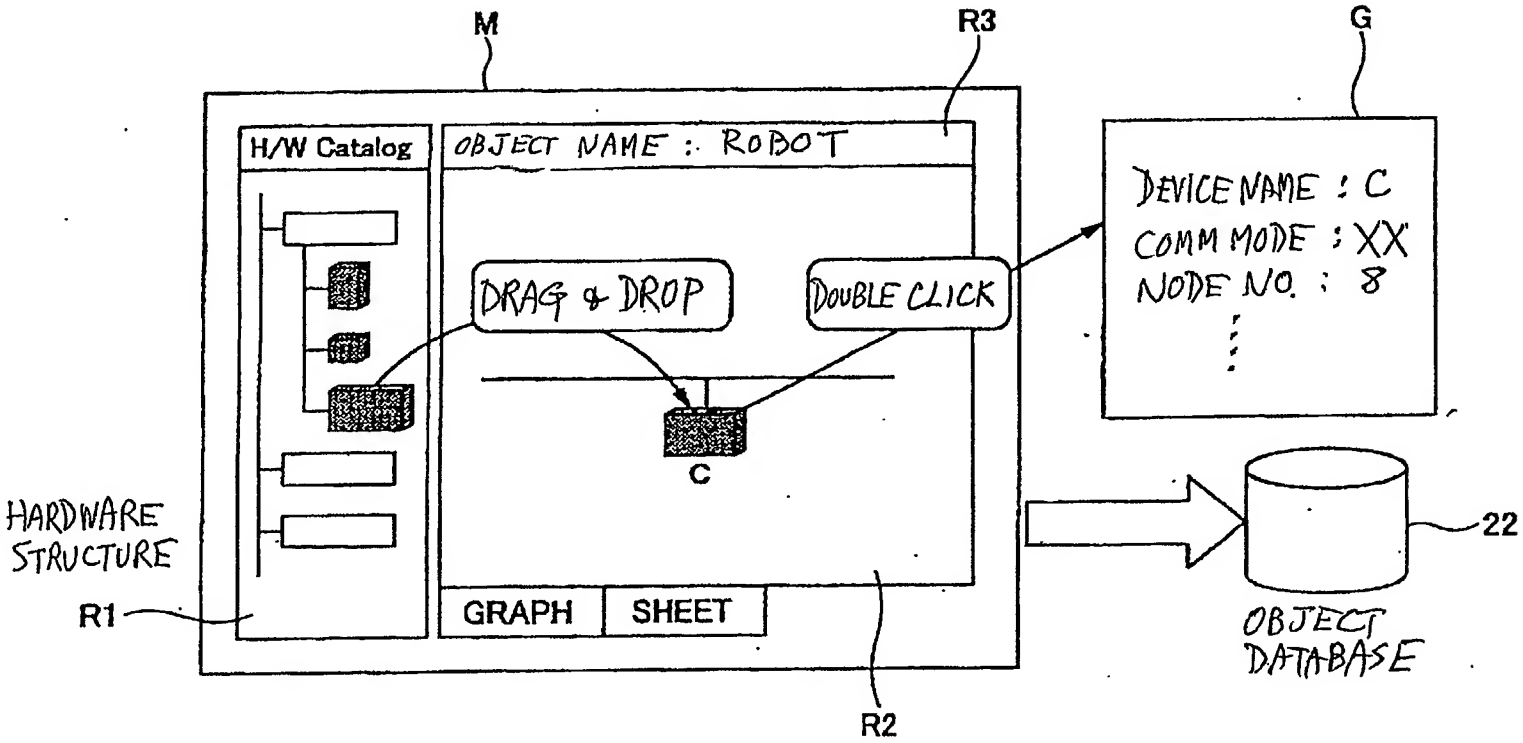

Fig. 6

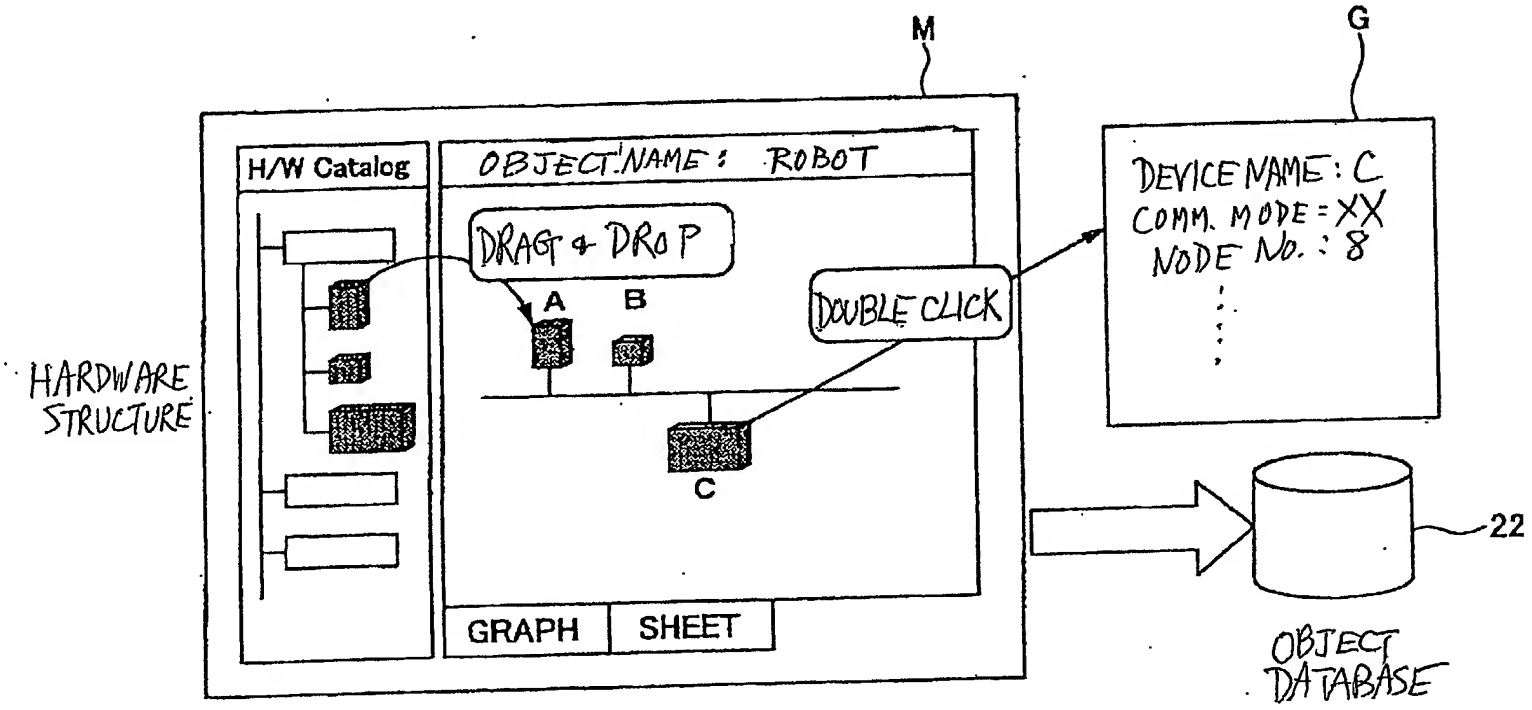
M
G
H/W Catalog
OBJECT NAME : ROBOT
DRAG & DROP
A
B
C
DOUBLE CLICK
DEVICE NAME : C
COMM. MODE = XX
NODE No. : 8
HARDWARE STRUCTURE
GRAPH
SHEET
22
OBJECT DATABASE

Fig. 7

```
[Profile]
ObjName= ROBOT

DeviceNum=1
  DevName0=C
  SerialNo0=
  NodeNo0=8 // COMMUNICATION ADDRESS
  INSize0=2 //byte
  INadr0=   // MAPPED ADDRESS TO CONTROLLER MEMORY
  OUTSize0=2 //byte
  OUTadr0= //:MAPPED ADDRESS TO CONTROLLER MEMORY
  Communication0=0 //COMMUNICATION MODE
```

Fig 8

```
BYTE Add_Val(BYTE X, BYTE Y)
{
  BYTE A,B;C
  Get_Attribute("IN_param1", A);
  Get_Attribute("IN_param2", B);
  C=A+B;
  Set_Attribute("OUT_param1, C);
  Return C
}
```

Fig 11

```
ObjName= ROBOT.

DeviceNum=3
  DevName0=C
  SerialNo0=
  NodeNo0=8
  INSize0=2
  INadr0=
  OUTSize0=2
  OUTadr0=
  Communication0=0

  DevName1=A
  SerialNo1=
  NodeNo1=3
  INSize1=4
  INadr1=
  OUTSize1=4
  OUTadr1=
  Communication1=0

  DevName2=B
  SerialNo2=
  NodeNo2=1
  INSize2=1
  INadr2=
  OUTSize2=1
  OUTadr2=
  Communication2=0
```

Fig. 9

```
[Profile]
ObjName=ROBOT

DeviceNum=1
  DevName0=C
  SerialNo0=
  NodeNo0=8  //COMMUNICATION ADDRESS
  INSize0=2  //byte
  INadr0=    //MAPPED ADDRESS TO CONTROLLER MEMORY
  OUTSize0=2 //byte
  OUTadr0=   //MAPPED ADDRESS TO CONTROLLER MEMORY
  Communication0=0  //COMMUNICATION MODE

[Attribute]
IN_Num=2
  ValName0=IN_Param1  //VARIABLE NAME
  ValSize0=1  //1byte  //VARIABLE SIZE
  Adr0=0/0  //ADDRESS INSIDE CONTROL OBJECT(0BIT OF 0 CH)
  ValName1=IN_Param2  //VARIABLE NAME
  ValSize1=1  //byte  //VARIABLE SIZE
  Adr0=0/8  //ADDRESS INSIDE CONTROL OBJECT(8BIT OF 0 CH)

OUT_Num=2
  ValName0=OUT_Param1
  ValSize0=1  //1byte  //VARIABLE SIZE
  Adr0=0/0  //ADDRESS INSIDE CONTROL OBJECT(0BIT OF 0 CH)
  ValName1=IN_Param2  //VARIABLE NAME
  ValSize1=1  //byte  //VARIABLE SIZE
  Adr0=0/8  //ADDRESS INSIDE CONTROL OBJECT(8BIT OF 0 CH)

[Service]
```

Fig. 10

```
[Profile]
ObjName=: ROBOT

DeviceNum=1
  DevName0=C
  SerialNo0=
  NodeNo0=8  // COMMUNICATION ADDRESS
  INSize0=2  //byte
  INadr0=    // MAPPED ADDRESS TO CONTROLLER MEMORY
  OUTSize0=2  //byte
  OUTadr0=  // MAPPED ADDRESS TO CONTROLLER MEMORY
  Communication0=0  //COMMUNICATION MODE

[Attribute]
IN_Num=2
  ValName0=IN_Param1  //VARIABLE NAME
  ValSize0=1  //1byte    //VARIABLE SIZE
  Adr0=0/0  //ADDRESS INSIDE CONTROL OBJECT(0BIT OF 0 CH)
  ValName1=IN_Param2  //VARIABLE NAME
  ValSize1=1  //byte    //VARIABLE SIZE
  Adr0=0/8  //ADDRESS INSIDE CONTROL OBJECT(8BIT OF 0 CH)

OUT_Num=2
  ValName0=OUT_Param1
  ValSize0=1  //1byte    //VARIABLE SIZE
  Adr0=0/0  //ADDRESS INSIDE CONTROL OBJECT(0BIT OF 0 CH)
  ValName1=IN_Param2  //VARIABLE NAME
  ValSize1=1    //byte    //VARIABLE SIZE
  Adr0=0/8  //ADDRESS INSIDE CONTROL OBJECT(8BIT OF 0 CH)

[Service]
  ServiceNum=1
  ServiceName0=BYTEAdd_Val([IN]BYTE  X[IN]BYTE  Y)
```

Fig. 12

22

```
[Profile]
ObjName= ROBOT

DeviceNum=1
  DevName0=C
  SerialNo0=
  NodeNo0=8  //: COMMUNICATION ADDRESS
  INSize0=2  //byte
  INadr0=    // MAPPED ADDRESS TO CONTROLLER MEMORY
  OUTSize0=2  //byte
  OUTadr0=  /, MAPPED ADDRESS TO CONTROLLER MEMORY
  Communication0=0  //:COMMUNICATION MODE

[Attribute]
IN_Num=2
  ValName0=IN_Param1  //VARIABLE NAME
  ValSize0=1  //1byte  //:VARIABLE SIZE
  Adr0=0/0  //ADDRESS INSIDE CONTROL OBJECT(0BIT OF 0 CH)
  ValName1=IN_Param2  //:VARIABLE NAME
  ValSize1=1  //byte  //:VARIABLE SIZE
  Adr0=0/8  //ADDRESS INSIDE CONTROL OBJECT(8BIT OF 0 CH)

OUT_Num=2
  ValName0=OUT_Param1
  ValSize0=1  //1byte  //:VARIABLE SIZE
  Adr0=0/0  //ADDRESS INSIDE CONTROL OBJECT(0BIT OF 0 CH)
  ValName1=IN_Param2  //VARIABLE NAME
  ValSize1=1  //byte  // VARIABLE SIZE
  Adr0=0/8  //:ADDRESS INSIDE CONTROL OBJECT(8BIT OF 0 CH)

[Service]
  ServiceNum=1
  ServiceName0=BYTEAdd_Val([IN]BYTE X[IN]BYTE Y)
```

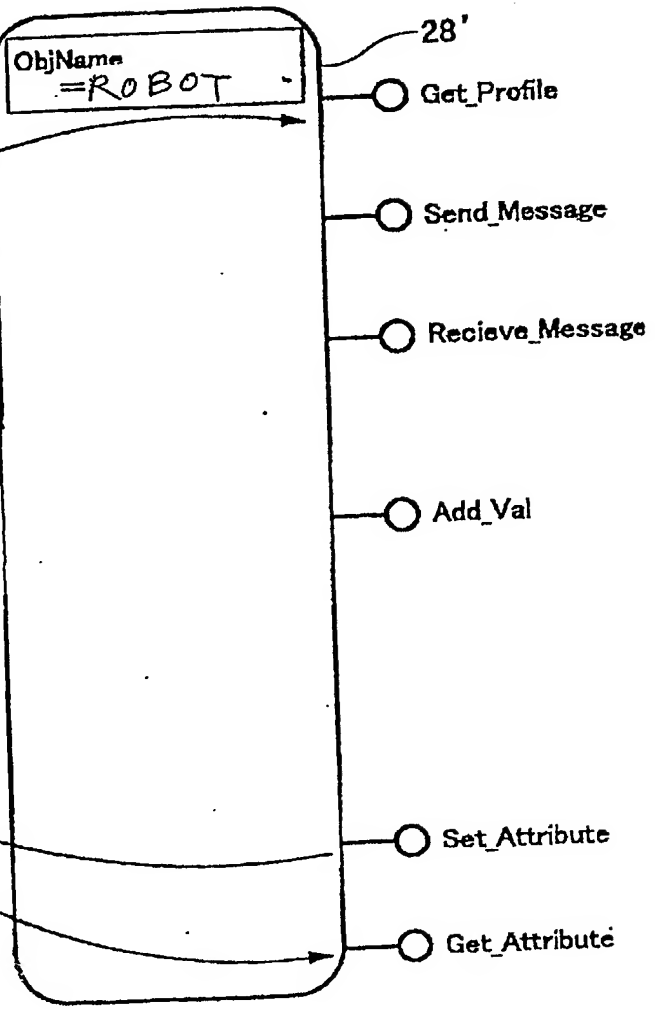

Fig 3

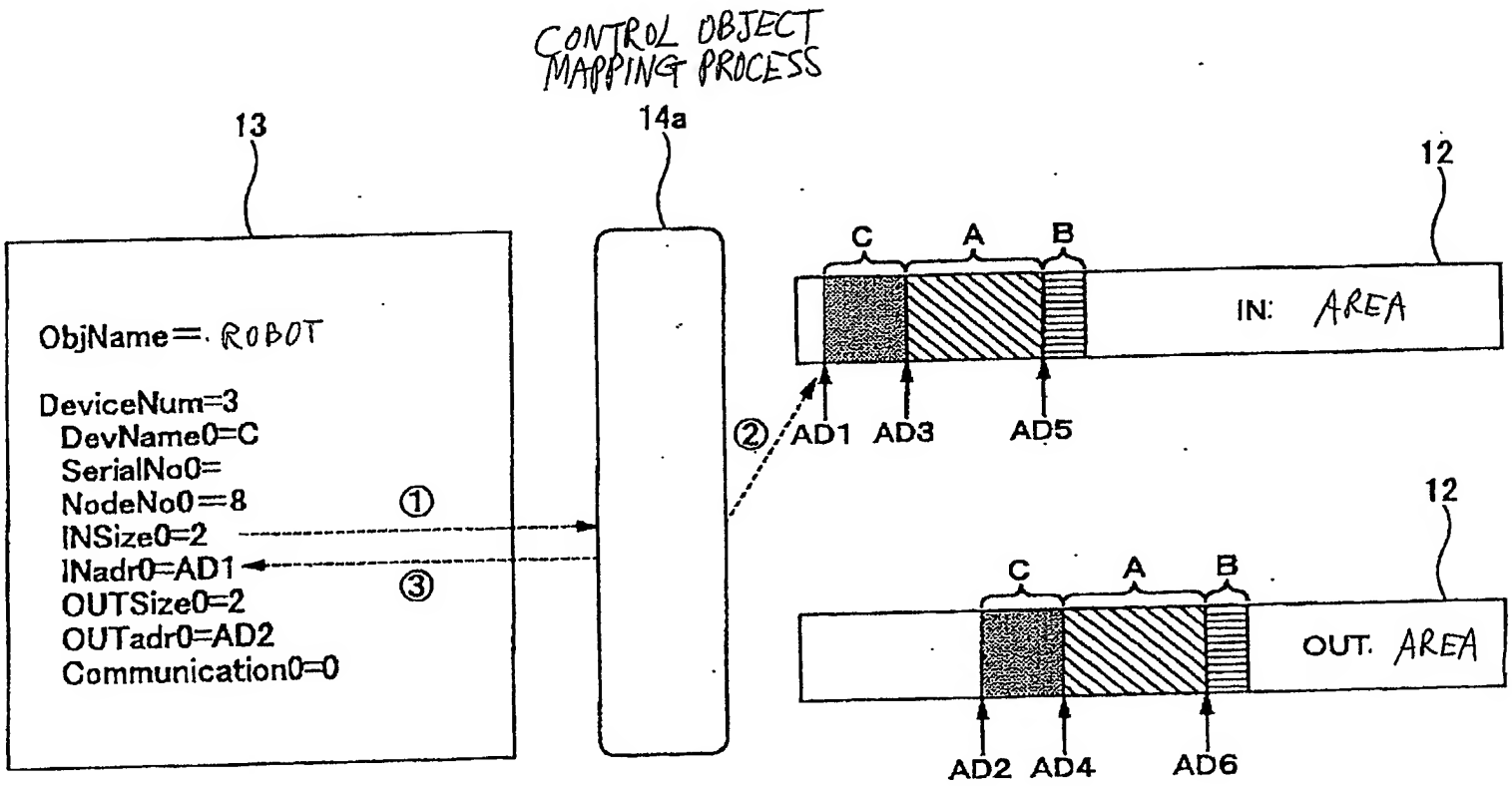
CONTROL OBJECT MAPPING PROCESS
13
14a
12
ObjName=ROBOT
DeviceNum=3
DevName0=C
SerialNo0=
NodeNo0=8
INSize0=2
INadr0=AD1
OUTSize0=2
OUTadr0=AD2
Communication0=0
①
②
③
C
A
B
IN: AREA
AD1
AD3
AD5
12
C
A
B
OUT. AREA
AD2
AD4
AD6

Fig. 14

```
ObjName=. ROBOT

DeviceNum=3
  DevName0=C
  SerialNo0=SN-01
  NodeNo0=8
  INSize0=2
  INadr0=AD1
  OUTSize0=2
  OUTadr0=AD2
  Communication0=0

  DevName1=A
  SerialNo1=
  NodeNo1=3
  INSize1=4
  INadr1=AD3
  OUTSize1=4
  OUTadr1=AD4
  Communication1=0

  DevName2=B
  SerialNo2=
  NodeNo2=1
  INSize2=1
  INadr2=AD5
  OUTSize2=1
  OUTadr2=AD6
  Communication2=0
```

Fig. 15

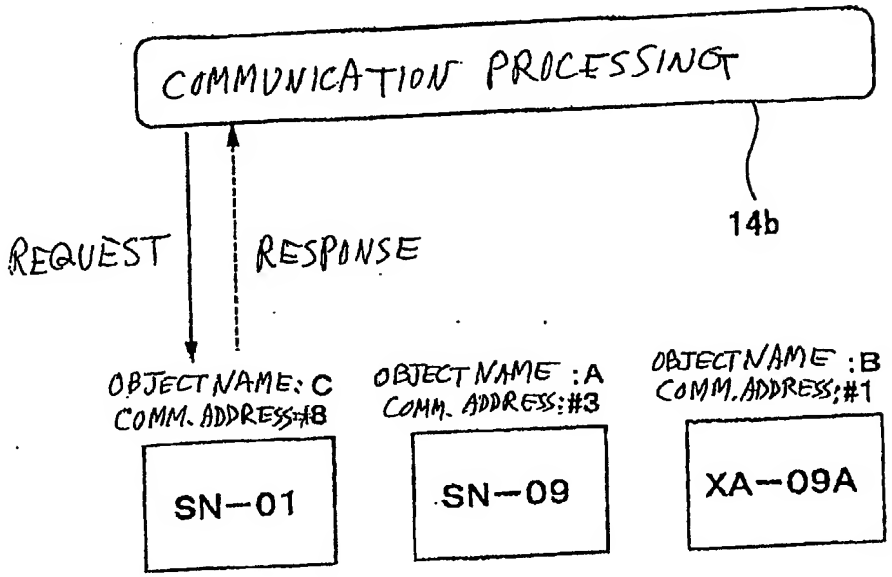

Fig. 16

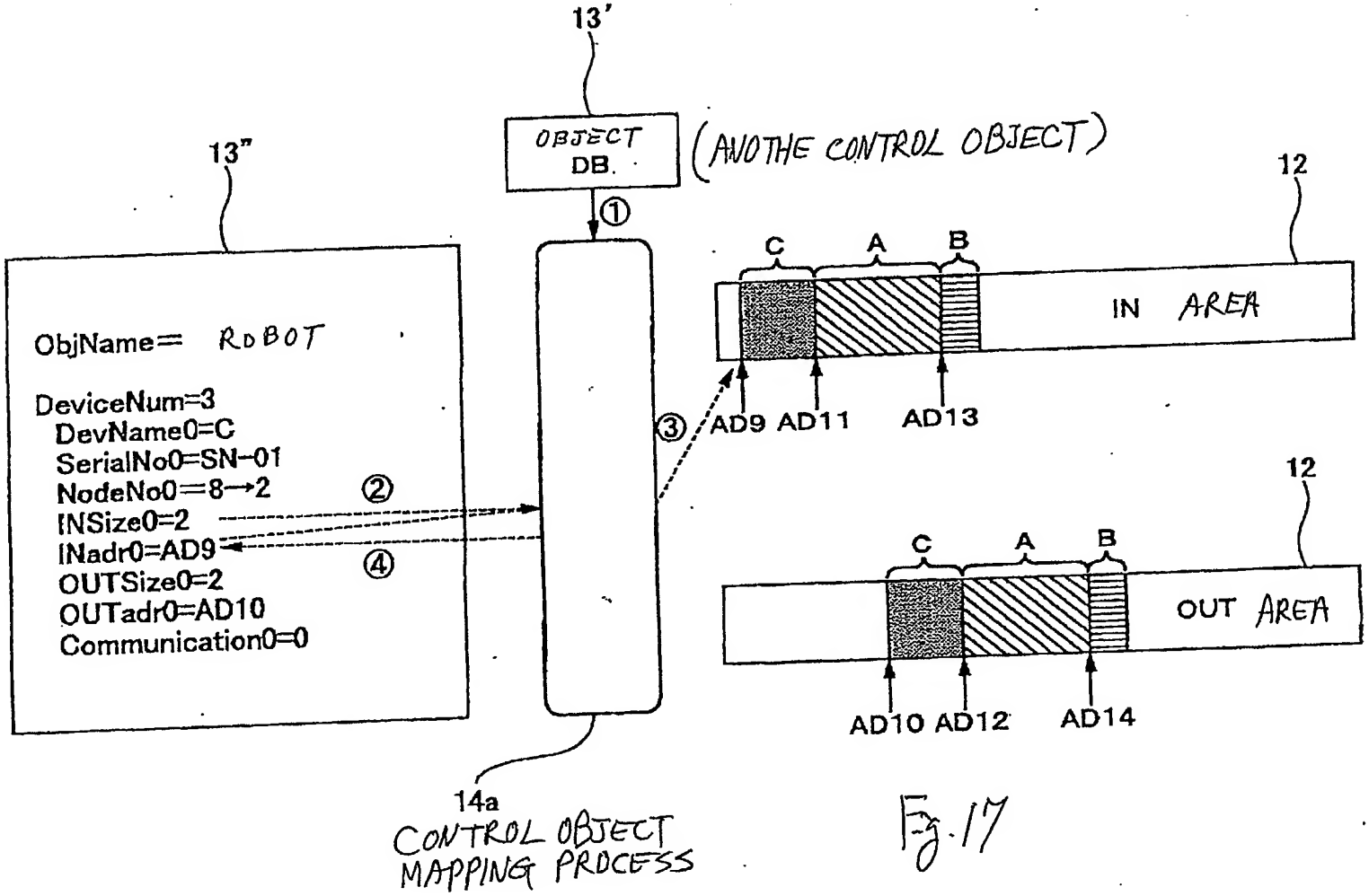
13'
OBJECT DB.
(ANOTHE CONTROL OBJECT)
13"
12
ObjName= ROBOT
DeviceNum=3
DevName0=C
SerialNo0=SN-01
NodeNo0=8→2
INSize0=2
INadr0=AD9
OUTSize0=2
OUTadr0=AD10
Communication0=0
①
②
③
④
C
A
B
IN AREA
AD9 AD11 AD13
12
C
A
B
OUT AREA
AD10 AD12 AD14
14a
CONTROL OBJECT MAPPING PROCESS

Fig. 17

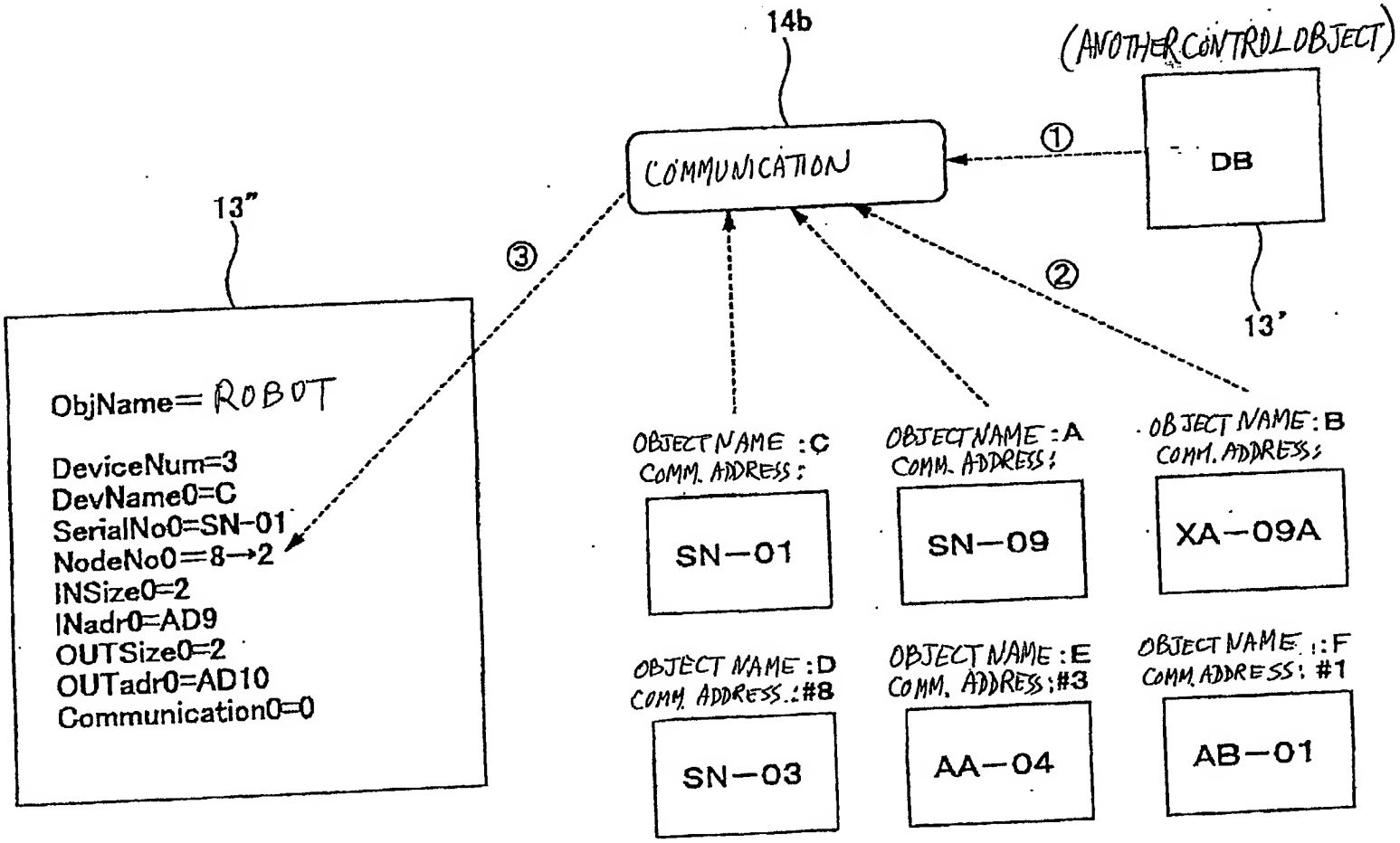
14b
(ANOTHER CONTROL OBJECT)
COMMUNICATION
①
DB
13"
③
②
13'
ObjName= ROBOT
DeviceNum=3
DevName0=C
SerialNo0=SN-01
NodeNo0=8→2
INSize0=2
INadr0=AD9
OUTSize0=2
OUTadr0=AD10
Communication0=0
OBJECT NAME :C
COMM. ADDRESS:
SN-01
OBJECT NAME :A
COMM. ADDRESS:
SN-09
OBJECT NAME :B
COMM. ADDRESS:
XA-09A
OBJECT NAME :D
COMM. ADDRESS:#8
SN-03
OBJECT NAME :E
COMM. ADDRESS:#3
AA-04
OBJECT NAME :F
COMM. ADDRESS: #1
AB-01

Fig-18

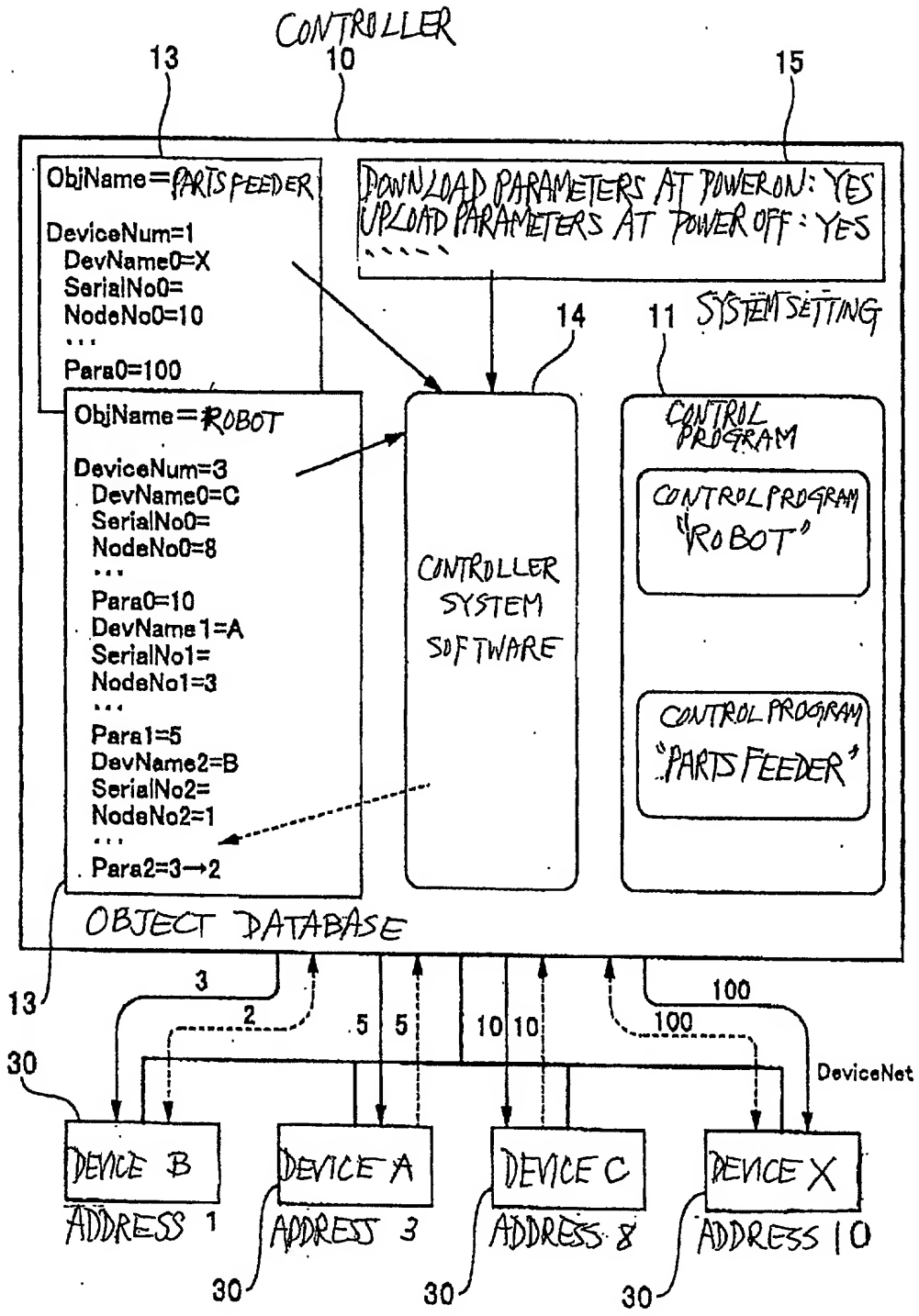
CONTROLLER
13
10
15
ObjName=PARTSFEEDER
DeviceNum=1
DevName0=X
SerialNo0=
NodeNo0=10
Para0=100
ObjName=ROBOT
DeviceNum=3
DevName0=C
SerialNo0=
NodeNo0=8
Para0=10
DevName1=A
SerialNo1=
NodeNo1=3
Para1=5
DevName2=B
SerialNo2=
NodeNo2=1
Para2=3→2
OBJECT DATABASE
DOWNLOAD PARAMETERS AT POWERON: YES
UPLOAD PARAMETERS AT POWER OFF: YES
14
11
SYSTEM SETTING
CONTROLLER SYSTEM SOFTWARE
CONTROL PROGRAM
CONTROL PROGRAM "ROBOT"
CONTROL PROGRAM "PARTS FEEDER"
3
2
5
5
10
10
100
100
DeviceNet
30
DEVICE B
ADDRESS 1
DEVICE A
ADDRESS 3
DEVICE C
ADDRESS 8
DEVICE X
ADDRESS 10

Fig. 19

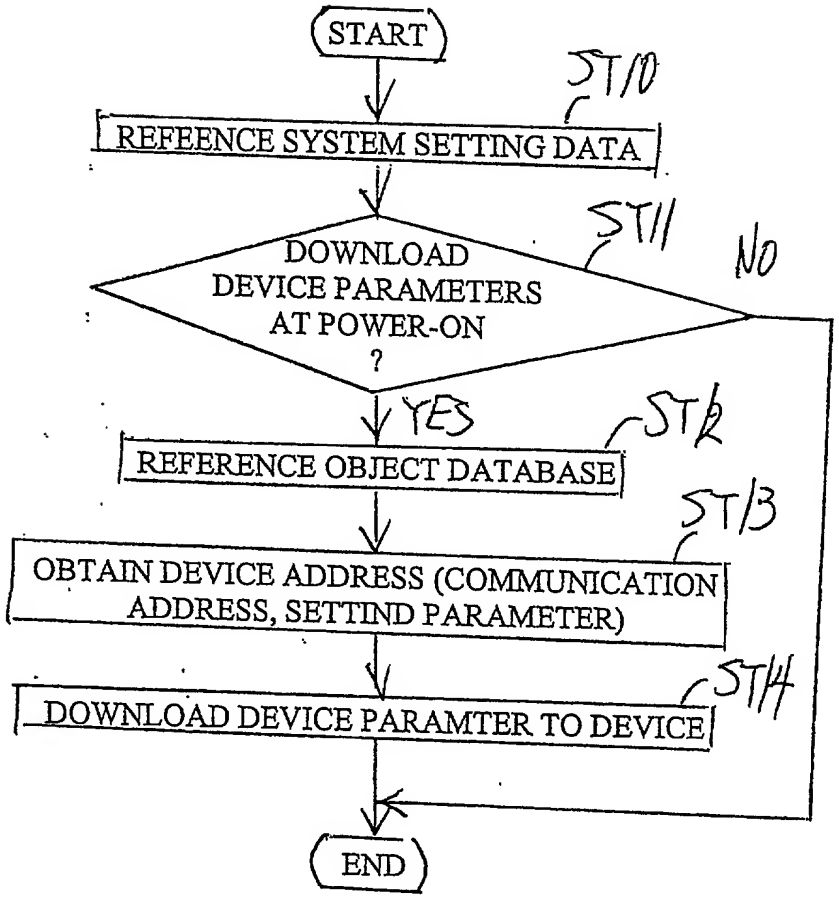
START
ST10
REFEENCE SYSTEM SETTING DATA
ST11
DOWNLOAD DEVICE PARAMETERS AT POWER-ON ?
NO
YES
ST12
REFERENCE OBJECT DATABASE
ST13
OBTAIN DEVICE ADDRESS (COMMUNICATION ADDRESS, SETTIND PARAMETER)
ST14
DOWNLOAD DEVICE PARAMTER TO DEVICE
END

Fig. 20

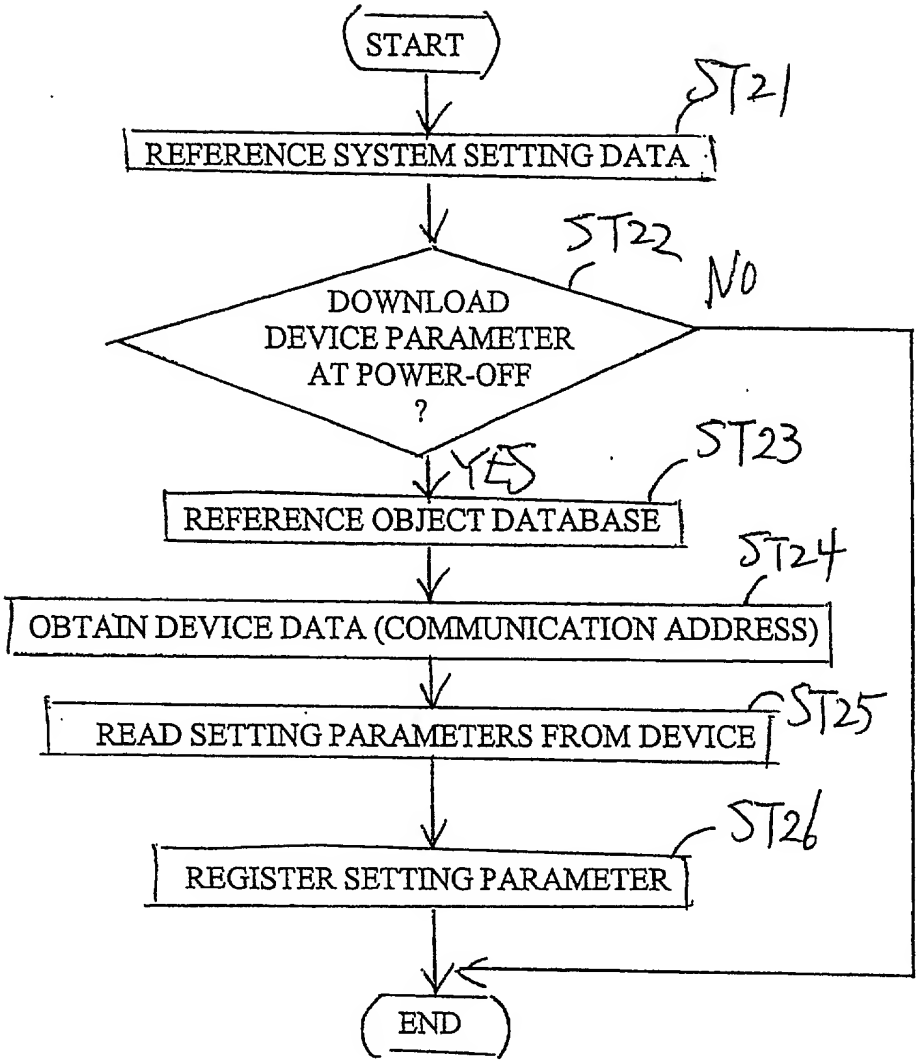
START
ST21
REFERENCE SYSTEM SETTING DATA
ST22
DOWNLOAD DEVICE PARAMETER AT POWER-OFF ?
NO
YES
ST23
REFERENCE OBJECT DATABASE
ST24
OBTAIN DEVICE DATA (COMMUNICATION ADDRESS)
ST25
READ SETTING PARAMETERS FROM DEVICE
ST26
REGISTER SETTING PARAMETER
END

Fig. 21

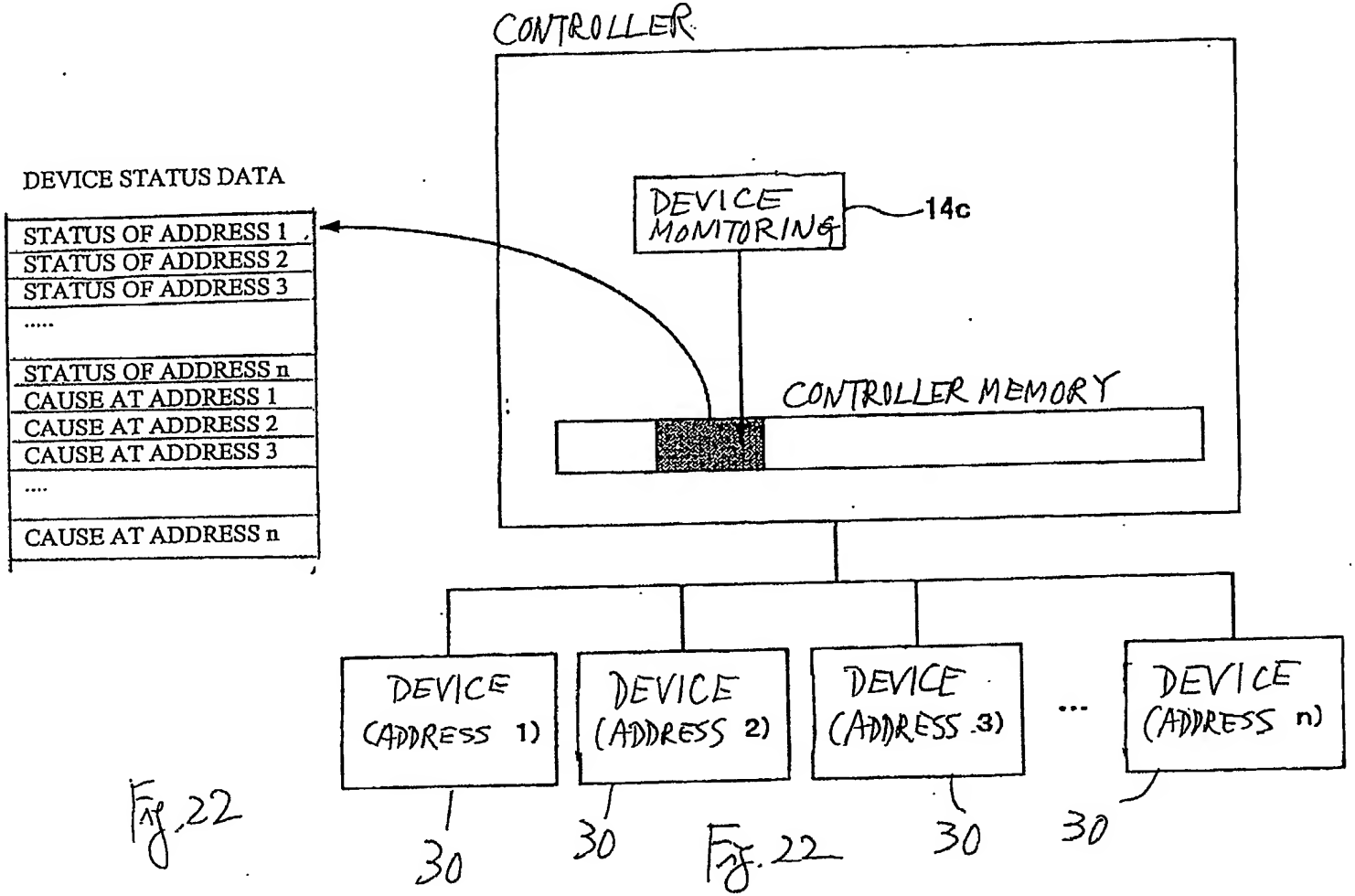
CONTROLLER
DEVICE STATUS DATA
STATUS OF ADDRESS 1
STATUS OF ADDRESS 2
STATUS OF ADDRESS 3
.....
STATUS OF ADDRESS n
CAUSE AT ADDRESS 1
CAUSE AT ADDRESS 2
CAUSE AT ADDRESS 3
....
CAUSE AT ADDRESS n
DEVICE MONITORING
14c
CONTROLLER MEMORY
DEVICE (ADDRESS 1)
DEVICE (ADDRESS 2)
DEVICE (ADDRESS 3)
...
DEVICE (ADDRESS n)
30
30
30
30

Fig. 22

Fig. 22

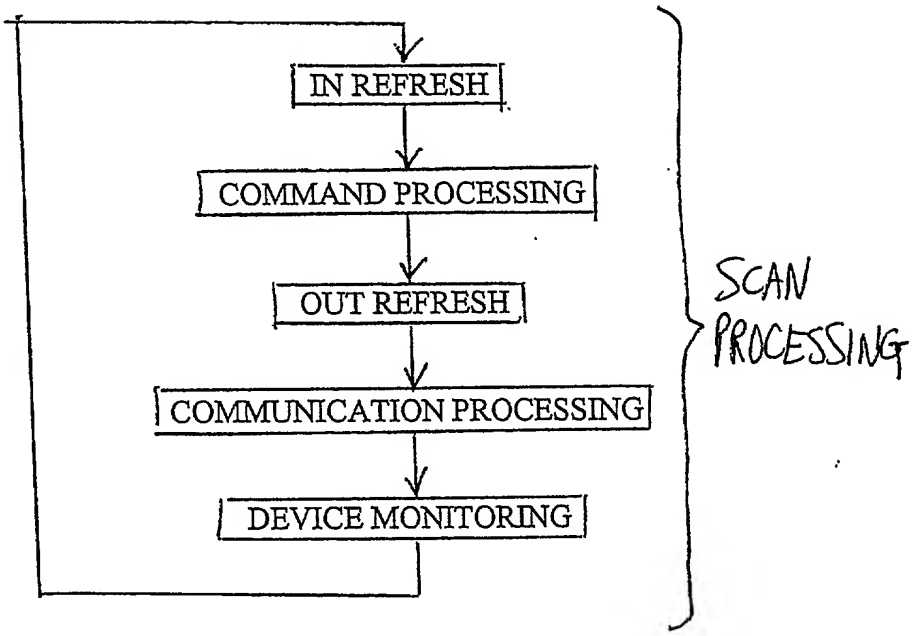
IN REFRESH
COMMAND PROCESSING
OUT REFRESH
COMMUNICATION PROCESSING
DEVICE MONITORING
SCAN PROCESSING

Fig. 23

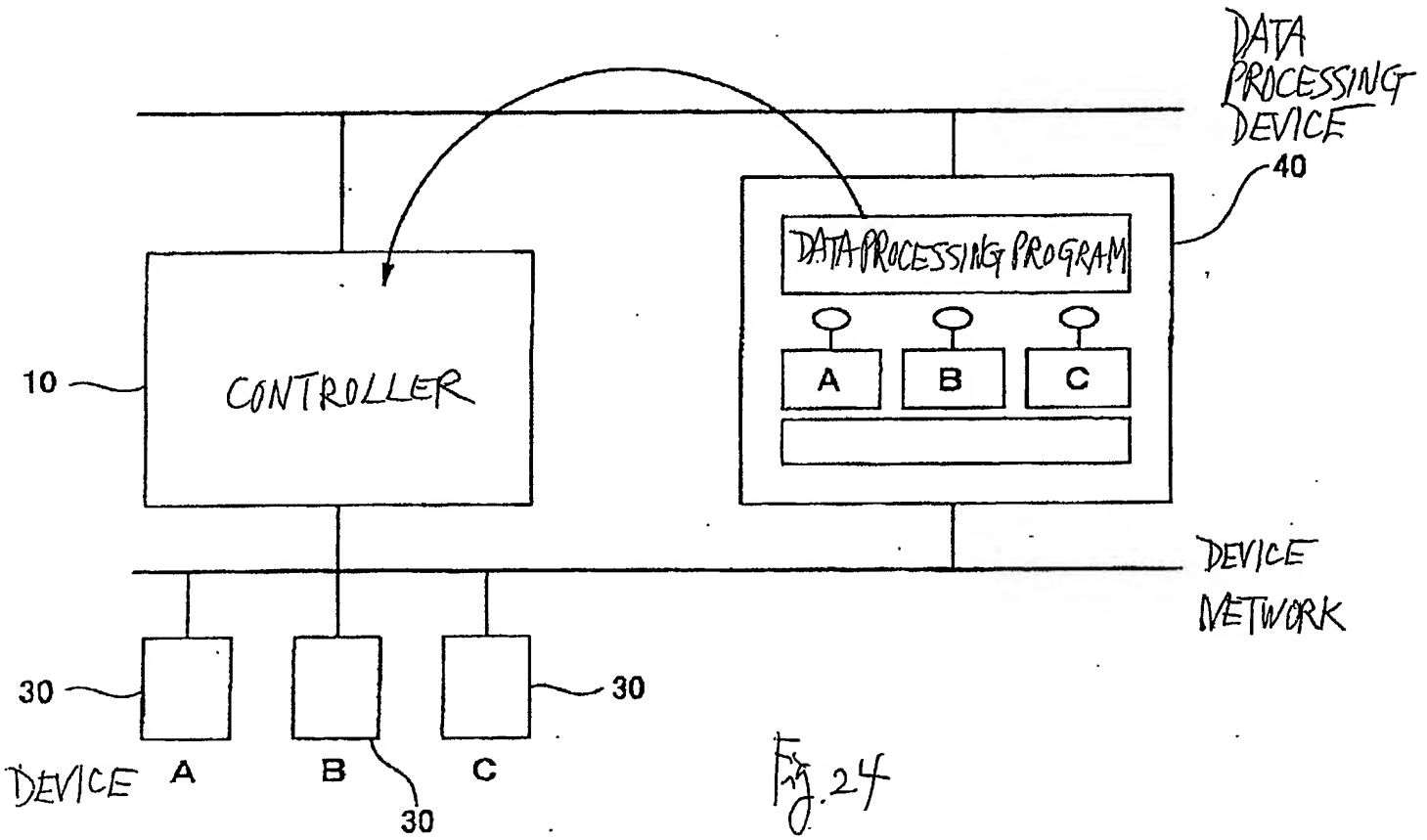
DATA PROCESSING DEVICE
40
DATA PROCESSING PROGRAM
A
B
C
10
CONTROLLER
DEVICE NETWORK
30
30
DEVICE A
B
C
30

Fig. 24